



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/755,844	01/12/2004	Carsten Ahrens	1890-0037	8442

7590

09/12/2005

Harold C. Moore
Maginot, Moore & Beck
Bank One Center/Tower
111 Monument Circle, Suite 3000
Indianapolis, IN 46204-5115

EXAMINER

KESHAVAN, BELUR V

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

78

Office Action Summary	Application No.	Applicant(s)	
	10/755,844	AHRENS ET AL.	
	Examiner	Art Unit	
	Belur V. Keshavan	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9-11 and 13-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 26 is/are allowed.
- 6) ☒ Claim(s) 1-7,9-11,13-15 and 17 is/are rejected.
- 7) ☐ Claim(s) 16 and 18-25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>03/07/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status Of Claims

Claims 1, 9 and 18 are amended. Claims 8 and 12 are cancelled. A new Independent claim 26 is introduced.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5, 9-11, 13-15, and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Yao et al. (US 2004/0253809).

Regarding claims 1-5 and 14, Yao discloses in figures 1A and 1B a method or producing a contact structure on a structured surface of a silicon semiconductor substrate (100) wherein the structured surface is a surface of an opening in the substrate in paragraph [0027] comprising: producing a first conductive layer (105) in paragraphs [0025] and [0028] comprising tungsten by CVD deposition; producing a conductive seed layer comprising a multiple-layer structure in

paragraphs [0020] and [0028] on the first layer in paragraph [0028]; and
electroplating the contact structure (106) on the seed layer in paragraph [0029].

Regarding claims 9, 10 and 15, Yao discloses in paragraph [0020] wherein the seed layer includes a stack comprising a multiple-layer structure one or several layers of same comprising a metallic barrier material (105).

Regarding claim 11, Yao discloses in paragraph [0028] wherein the barrier metals (105) are selected from the group comprising Ta, TaN, Ti, TiN and TiW.

Regarding claim 13, Yao discloses in figure 1B, wherein selectively removing the contact structure (106) the seed layer and the first conductive layer (105) acts as a stop layer.

Regarding claim 17, Yao discloses in paragraph [0028] that the first conductive layer consists only of tungsten.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yao et al.

Yao teaches all of the features and limitations of the base claim but lack the vertical depth of the opening of 20 microns and an aspect ratio of greater than or equal to 1:4. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a vertical depth of the opening of 20 microns and an aspect ratio of greater than or equal to 1:4 since it has been held that where the general conditions of claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

In re Aller, 105 USPQ 233.

Objections

Claims 16 and 18-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Allowable Subject Matter

Claim 26 is allowed.

The primary reason for the indication of allowability of claims 16 and 18-25 and the allowability of the claim 26 is the inclusion therein, in combination as currently claimed of the limitations comprising inter alia a method of removing material from the reverse side of the substrate to expose the reverse side of the contact structure and forming bumps for electrically contacting the contact structure.

Response to Arguments

Applicant's filed on 08/08/2005 have been fully considered but they are not persuasive.

The examiner has noted amendments to claims 1, 9 and 18, cancellation of claims 8 and 12 and the introduction of a new independent claim 26.

The examiner notes applicant's arguments that Yao fails to teach producing a first conductive layer comprised of tungsten on a structural surface and producing a second conductive seed layer comprised of a multiple layer structure. However, the examiner is not persuaded by this argument because as stated above, Yao discloses a first conductive layer comprising tungsten on a structural surface and producing a conductive seed layer on the first layer the seed layer comprising a multiple layer structure.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will

be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Belur V. Keshavan whose telephone number is 571-272-1894. The examiner can normally be reached on 8-4:30 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Bvk. *BK*
August 24, 2005.

Belur V. Keshavan.
Examiner. Art Unit 2825.



MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800